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INTEGRATIVE REVIEW ARTICLE

BIOSAFETY MEASURES IN DENTAL PROCEDURES: AN INTEGRATIVE REVIEW MEDIDAS DE BIOSSEGURANÇA EM PROCEDIMENTOS ODONTOLÓGICOS: REVISÃO INTEGRATIVA

MEDIDAS DE BIOSEGURIDAD EN LOS PROCEDIMIENTOS DENTALES: REVISIÓN INTEGRADORA

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ABSTRACT

Objective: analyzing the international scientific literature about biosafety in dental procedures. **Method:** an integrative review, with a view to answering the question << *What is the panorama of biosafety in dental procedures and its relationship to the health of the oral health worker?* >>. It was held in international databases: PUBMED, Elsevier and Springer Link, covering the years 2010 to 2015. Data were processed in IRAMUTEQ software and analyzed through the Descending Hierarchical Classification. **Results:** there were obtained six classes: Conditions of work provided by the employer; Organizational climate and the perception of safety; Standard precaution material, its availability and disposition in the office; Biosecurity in preventing infection; Professional exposure to biological agents and the dental procedure and the risk of accidents. **Conclusion:** there is a consensus about the importance, implementation and proper use of biosafety measures in the development of practice of dentists surgeons and auxiliary. **Descriptors:** Biosafety; Dental Biosafety; Dentistry.

RESUMO

Objetivo: analisar a produção científica internacional sobre biossegurança em procedimentos odontológicos. **Método:** revisão integrativa, com vistas a responder a questão << *Qual o panorama da biossegurança em procedimentos odontológicos e sua relação com a saúde do trabalhador de saúde bucal?* >> Foi realizada nas bases de dados internacionais: PUBMED, Elsevier e Springer link, contemplando os anos de 2010 a 2015. Os dados foram processados no software IRAMUTEQ e analisados por meio da Classificação Hierárquica Descendente. **Resultados:** obteve-se 6 classes: Condições de trabalhos fornecidas pelo empregador; Clima organizacional e a percepção de segurança; Material de precaução padrão, sua disponibilidade e disposição no consultório; A biossegurança na prevenção da infecção; Exposição do profissional a agentes biológicos e o procedimento odontológico e o risco de acidentes. **Conclusão:** há um consenso sobre a importância, implementação e correto uso das medidas de biossegurança no desenvolvimento da prática dos cirurgiões dentistas e auxiliares. **Descritores:** Biossegurança; Biossegurança Dental; Odontologia.

RESUMEN

Objetivo: analizar la literatura científica internacional acerca de la bioseguridad en los procedimientos dentales. **Método:** una revisión integradora, con el fin de responder a la pregunta << *¿Cuál el panorama de la bioseguridad en los procedimientos dentales y su relación con la salud del trabajador de la salud oral?* >> Se celebró en bases de datos internacionales: PUBMED, Elsevier y Springer link, que abarca los años de 2010 hasta 2015. Los datos fueron procesados en el software IRAMUTEQ y analizados a través de la Clasificación Jerárquica Descendente. **Resultados:** se obtuvieron seis clases: Condiciones de trabajo proporcionadas por el empleador; Clima organizacional y la percepción de la seguridad; Material de precaución estándar, su disponibilidad de y la disposición en la oficina; Bioseguridad en la prevención de la infección; Exposición del profesional a agentes biológicos y el procedimiento dental y el riesgo de accidentes. **Conclusión:** hay un consenso acerca de la importancia, la aplicación y el uso adecuado de las medidas de bioseguridad en el desarrollo de la práctica de los dentistas y cirujanos auxiliares. **Descriptores:** Bioseguridad; Bioseguridad Dental; Odontología.

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INTRODUCTION

Health work almost always involves risks for those responsible for care, and the risk of accidents inherent in certain human activities. In this sense, when it comes to health professionals, studies attribute many risks of occupational accidents.¹

The risk is one or more conditions of a variable with potential to cause harm. Some health categorical are more prone to occupational accidents especially for individuals who are exposed to daily routines that increase the risk of these occupational exposures, such as dentists and oral health aides.²

The study of occupational exposure of workers to health risks is recent and refers to the emergence of the epidemic of Acquired Immunodeficiency Syndrome, specifically the first case of occupational transmission of human immunodeficiency virus (HIV). Thus, the application of bio-safety standards is necessary to prevent the occurrence of harm on workers' health.³

Health Biosafety covers various risks: chemical, physical, biological, ergonomic and psychosocial, present in the routine of health professionals. Among these risks, the biological is the most common among health professionals due the enormous potential for exposure to these agents and the high frequency of occupational accidents.⁴

Most of the exhibits are related to Hepatitis B, C and HIV through the contaminated blood. In this sense, to prevent the transmission of disease-causing microorganisms, national and international bodies such as the National Health Surveillance Agency (ANVISA) and the Centers for Disease Control and Prevention (CDC) indicate that during or after the patient care, professionals must adopt standard precautions (PP), especially hand hygiene, use of personal protective equipment (PPE) and collective protection (EPC). The use of these measures significantly reduce the chances of exposure to biological agents as this guarantees safe handling of items and surfaces.⁵

Dental professionals, dentists and assistants in oral health, are exposed to a wide range of occupational exposures that can threaten their health.⁶

Reflecting on these questions that guided and led the writing of this review, we intend to achieve with this investigation the following goal:

- Analyzing the international scientific literature about biosafety in dental procedures.

METHOD

This is an integrative review about biosafety in dental procedures. The choice of method is made by the same, enables gathering and synthesizing the results of multiple studies published about delimited theme in a systematic and orderly manner, contributing to the issue of deepening research, in addition to being considered an important evidence-based practice tool.⁷

This review was operationalized from the following steps: issue identification and selection of the research question; establishment of inclusion and exclusion criteria; identification of pre-screened and selected studies; categorization of the selected studies; analysis and interpretation of results and presentation of the review/synthesis of knowledge.⁷

To conduct this review, there was defined as guiding question: "What is the viewpoint for biosafety in dental procedures and its relationship to the health of the oral health worker?", drawn up by the PICO strategy (P: Patient, I: intervention, C: comparison and O: outcomes or outcome).

To prepare the research a search was performed in PUBMED, Springer and Elsevier Link, using the combination of controlled descriptors, registered at the Medical Subject Headings (MeSH): Biosafety [or] Biosecurity [and] dental [and] dentistry.

Inclusion criteria were: only primary studies; available in its entirety, electronically, published in the period 2011 to 2015. The exclusion criteria were defined: repeated articles in the databases; opinion pieces; reflection of articles and editorials.

In the next step, studies were evaluated annually, language, methodology and applicability of the results in practice, methodological rigor of the studies, the measured interventions and the findings, type of study and the level of evidence, considering: 1 - systematic reviews or meta-analysis of relevant clinical trials; 2 - evidence of at least one randomized controlled clinical trial clearly delineated; 3 - well-designed clinical trials without randomization; 4 - cohort studies and well-designed case-control; 5 - systematic review of descriptive and qualitative studies; 6 - evidence derived from a single descriptive or qualitative study; 7 - authorities of opinion or expert committees

including information not interpretations based on research.⁷

For processing and analyzing the data, we used the software IRAMUTEQ (R pour les Interface Analyses Multidimensionnelles of Textes et Questionnaires).⁸ This is a program that is anchored in the R software and allows different forms of statistical analysis of the textual corpus. The IRAMUTEQ enables different types of analysis, from the simplest to multivariate such as Hierarchical Classification Descending. The software to perform classical lexical analysis identifies and reformats the text units, which become Initial Context units (ICU) in Elementary Context Units (ECU).⁹⁻¹⁰

There was the search for articles in databases and there were located 86 studies. The Corpus was formed by existing in conclusions data from studies, placed into a single text. The file was formed by the set of texts to be analyzed, fragmented by software in text segments.

RESULTS

There were selected 86 studies and after the adoption of the inclusion criteria, remained 12 for processing and analysis, which carefully obeyed the inclusion criteria and were related to the subject matter.

Title	Year	Level of evidence	Database
Knowledge, attitude and practice regarding risk of HIV infection through accidental needlestick injuries among dental students of Raichur, India ¹¹	2011	IV	PUBMED
Transplantation of Human Dental Pulp Stem Cells: Enhance Bone Consolidation in Mandibular Distraction Osteogenesis ¹²	2013	II	SciencDirect
Microbial contamination of dental unit waterlines and effect on quality of indoor air. ¹³	2014	IV	PUBMED
Predicting clinical biological responses to dental materials. ¹⁴	2012		PUBMED
Dental Implants in Patients With Osteoporosis: A Clinical Reality? ¹⁵	2011	V	SciencDirect
Dental perspective on biomedical waste and mercury management: a knowledge, attitude, and practice survey. ¹⁶	2011	IV	PUBMED
Waste Management in Dental Office ¹⁷	2012	V	PUBMED
Complying with the Occupational Safety and Health Administration: Guidelines for the Dental Office ¹⁸	2012		Elsevier
Awareness to health hazards and biosafety precautions among laboratory technicians working in tertiary-care center in Rajasthan, India ¹⁹	2015	IV	Springer Link
The prevalence of dental trauma and its association with illicit drug use among adolescents ²⁰	2013	IV	PUBMED
Impact of Pedagogical Method on Brazilian Dental Students' Waste Management Practice ²¹	2014	IV	PUBMED
Accidents at Work from Exposure to Biological Material Contamination of Viral Hepatitis "B" and "C" in a Brazilian Capital ²²	2014	IV	Springer Link

Figure 1. Articles that have contributed to the preparation of the Corpus, according to IRAMUTEQ. Teresina, 2014.

The IRAMUTEQ recognized separation of corpus of text segments 234 and 181 ECU's as well as the occurrence of class 6 with final achievement of 77,35%. The CHD took into account the combination of classes to fixed variables of the study: Database; Periodical publication and year of publication.

After analyzing the software, we proceeded with the identification and analysis of textual fields and interpretation of the meanings naming them with their senses into categories: 1 -Conditions of work provided by the employer, 2 - The organizational climate and safety awareness; 3 - Standard precaution material availability and disposition in the office; 4- Biosafety in preventing infection; 5 - Professional Exposure to biological agents; 6-

The dental procedure and the risk of accidents.

Through Hierarchical Classification Descending, the IRAMUTEQ presented dendogram of classes derived from the analysis and corpus processing. For the construction of the dendrogram (Figure 2), which illustrates the partitions that were made in the corpus, until it reached the final classes, and for subsequent analysis there were considered relevant those words that had gotten frequency equal to or higher than recorded medium frequency (3) , X² greater than or equal to 25 and p significance <0,0001. Each class was represented by the most significant words and their respective associations with the class (chi-square).

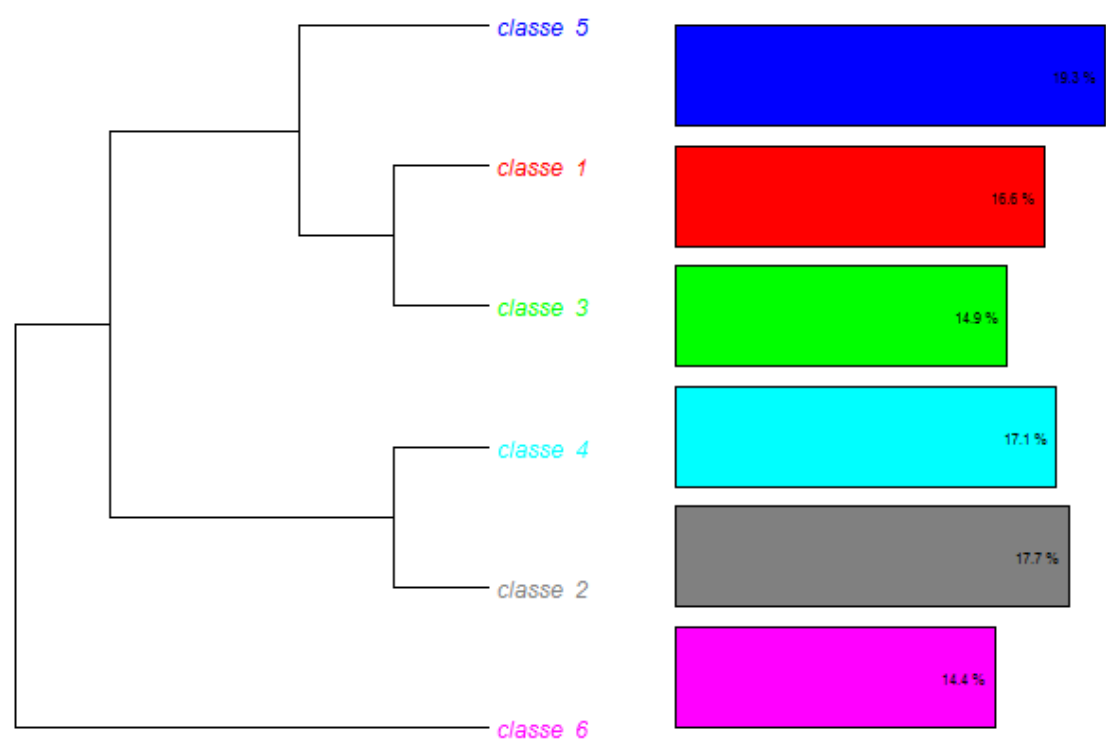


Figure 2. Theme structure of biosafety panorama in dental procedures. Teresina, 2014.

◆ **Class 1 - Conditions of work provided by the employer**

Class 1 has 30 ECUs, corresponding to 16,57% of the corpus and is directly associated with the class 3. The most frequent and significant words of these segments texts were: environment, PPE, employer, provide, manager, insurance, and work accident.

The words recall the importance of environmental control, or working environment as well as providing standard precautionary measures, which allow the use of precautionary measures. The responsibility for providing these conditions is attributed to health care manager.

◆ **Class 3 - Precautionary standard material availability in the Office**

Class 3 features 27 ECUs, corresponding to 14,92% of the corpus and is directly associated with the class 1. The words evoked more of these segments texts were available, gloves, lab coat, hat, use, presence, not, standards and assist.

The meanings of this class can be inferred that the availability of PPE, evoked more protective material, it is decisive in its use, and the provision thereof.

◆ **Class 5 - Professional exposure to biological agents**

Class 5 features 35 ECUs, corresponding to 19,34% of the corpus and is directly associated ace Classes 1 and 3. The words evoked more of these segments texts were: blood, fluids, HBV, HIV, exposure, mucosal membrane, viruses and transmission.

The content of this class shows the shared knowledge by dental professionals; they attach to biological agents greater risks, justified by the activities undertaken by these professionals associated with high prevalence and transmissibility of these agents.

◆ **Class 2 - The organizational rhythm and the perception of safety**

Class 2 features 32 ECUs, corresponding to 17,68% of the corpus and is linked directly to class 4. The most frequent and significant words of these segments texts were: security, climate, organization and perception factor.

The most significant words reveal that the perception of security can influence the work of professionals and that is related to the organizational climate of the institution.

◆ **Class 4 - The biosafety on prevention of infections**

Class 4 features 31 ECUs, corresponding to 17,13% of the corpus and is directly associated with the class 2. The words evoked more segments of these texts were: infection, cross, equipment, material, prevention, transmission, biological, article and biosafety standards.

The most significant words reveal that the correct compliance with biosafety standards and protocols are recognized as effective in preventing cross infection.

◆ **Class 6 - The dental procedure and the risk of accidents**

Class 6 features 26 ECUs, corresponding to 14,36% of the corpus and is responsible for closing the interconnections of all other classes. The words most evoked of this class

were: extracting a tooth, scratching, cutting, drilling, mouth, blood and fall.

These words refer to the idea that the way itself, as they develop the oral health practices, the procedure itself is already assigned a high burden of risk, which may result in an occupational accident threatening workers' health. Thus the Descending Hierarchical Classification, expressed in the text by the relationship between the classes, which allows us to infer the presence or absence of standard precautionary material, is a role assigned to the manager.

This availability is directly linked to exposure of professionals to occupational risk, and in the analyzed studies it was noticed the predominance of risk by biological agents. On the other hand, it was noted that biosecurity is strongly linked to prevention of infection, and when available for use provide professionals with a sense of safety, with influences in their own organization's local culture.

From these sensations and assignments of roles, the dental procedure as a whole is represented as a risky activity, which needs proper handling and application of standard precautionary measures to its prevention.

DISCUSSION

In Brazil, biosafety is regulated by Law 11,105, of March 25th, 2005, which provides for the National Biosafety Policy, and mentions the urgent need of health care institutions adopt the standard.⁴ Biosafety precautions is regulated by NR's (Regulatory Standards) that establish the basic guidelines for the implementation of measures to protect the safety and health of workers of health services. This also extends those workers who carry out their activities linked to the promotion and health care in general, but that permeate risks.²³

In this sense, surveys show the neglect of dental professionals in the correct use of standard precautions, culminating in possible disseminations of diseases. However, these same studies emphasize that oral health professionals recognize the severity of the exposure to risks as well as the need to apply the correct established methods of control of cross-infection.²⁴

The use of standard precautionary measures is justified by the fact that they represent a set of measures to prevent and control of cross-infection, and that these should be adopted universally, as effective in reducing the risk of occupational transmission of microorganisms in health services.²⁵

Oral health professionals at the top or middle level are vulnerable to the risk of cross-infection transmitted by infectious agents within the clinical environment in different ways, either by direct contact with infectious lesions, blood and contaminated saliva or by indirect contact through micro-organisms present in instruments, equipment and surfaces; Aspiration of microorganisms in aerosol; and by contact between people.²⁶

The dentist should be more careful, since its area of operation is the oral cavity an environment that offers multiple species of microbiota, and difficult access. The position of this body also requires these professionals to have a closer relationship with their patients, raising the possibility of exposure.⁶

The importance of avoiding contagion, keeping track of the health team, it is the duty of professional as well as health managers who must provide the necessary and appropriate action. It is known that occupational diseases are preventable with basic preventive measures such as the use of personal protective equipment (PPE) and collective protection techniques. In this context the importance of using PPE to safety and risk reduction in dental care is of paramount importance.²⁷

One can perceive the low adherence to biosafety norms in the professional category as a whole, so that the professional uses standard precautionary measures only in situations where the known diagnosis carries risks to their health, leaving unprotected in other situations.²⁸ This, it is necessary to focus on educational measures to ensure the implementation of standards and biosecurity protocols, providing support for the deployment, and the correct use of these measures.

CONCLUSION

The oral health professional, as well as the entire multidisciplinary team in health are daily exposed to various risks in the development of their daily practice. Aiming to minimize, prevent or reduce these risks, it is necessary the adoption of universal standard precautions measures.

This review highlighted the concern of the oral health team with the adoption of safety measures for responsible practice. There is, on the part of surgeons, dentists, assistants and health managers, greater awareness of the importance of the incorporation of appropriate technologies for infection control and biosecurity by providing resources to improve care. There was noticed a focus on

promoting lifelong learning teams to ensure the implementation of the proposed measures.

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